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A COMPARISON OF THE ACHIEVEMENT OF GRADE IX PUPILS IN VARIOUS SCHOOL ORGANIZATIONS

by

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A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE

OF MASTER OF EDUCATION

DEPARTMENT OF EDUCATIONAL ADMINISTRATION

EDMONTON, ALBERTA

APRIL, 1966

ABSTRACT

The purpose of this research was to compare the achievement of Grade IX pupils enrolled in schools where the Grade IX classes were placed in various organizational patterns. The data were obtained from Form 'A' cards and from student record cards made available by the Alberta Department of Education.

The four organizational patterns considered were: (1) Grade IX only, (2) Junior-Senior High School, (3) Junior High School, and (4) Senior High School. The placement of the Grade IX classes within one of these organizational patterns was determined from information concerning teacher assignments as reported for each school; the total number of grades within a school was not considered in the definition of organizational pattern. The pupil achievement, as measured by the High School Entrance Examination, was subjected to an analysis of covariance so that the effects of ability as measured by the SCAT test were removed.

It was indicated in the findings that in terms of total achievement Grade IX pupils in a Junior High School pattern of teacher organization or in a Grade IX only organization

achieved significantly higher than did pupils in a High School pattern of teacher organization. There was no significant difference between the achievement of pupils in a Grade IX only organization and pupils in a Junior-Senior High School organization. In no analysis did pupils in the High School or Junior-Senior High School patterns achieve significantly higher than did pupils in either of the other two organizational patterns. Pupils in the Junior High School organization achieved significantly higher than did pupils in the Senior High School organization in: total achievement, literature, language, social studies and science, but there was no significant difference in the achievement of the students in mathematics or reading.

This research may give some guidance regarding the placement of the Grade IX classes within the organizational patterns of the school as defined by teacher allocation. The degree to which achievement of Grade IX pupils is affected by the placement of the class should be examined in much greater detail. Some cognizance should be taken of such factors as promotion policies, provision of special teaching aids and, in general, the prestige or relative importance of the Grade IX classes, in relationship to other grades being taught by teachers, in each of the organizational patterns.

ACKNOWLEDGEMENTS

The writer wishes to express his appreciation to the Department of Education officials, Mr. V.R. Nyberg and Mr. S.T. Nichols for making available the records necessary for this study.

Special thanks must go to Mr. M. Wahlstrom, whose advice and accomplishments with the computer facilitated the completion of this research.

Dr. E. Miklos, under whose supervision the writer worked, is acknowledged for giving sound advice and encouragement which contributed to the completion of this thesis.

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CHAPTER I

INTRODUCTION

The secondary school as discussed in current literature does not consistently include the same range of grades as has been traditionally assigned to this educational level. It would appear that there are six-year, five-year, four-year and three-year secondary schools and that the possible grade inclusion ranges from Grade VII to Grade XIV. This variation in the description of a secondary school is a symptom of the resurgent interest being shown in the vertical organization of the schools, and may be an indication that strong challenges are being issued to all present organizational patterns.

In the province of Alberta the twelve years of public education have been divided into a 6-3-3 organizational pattern for the purposes of administration and curriculum development at the provincial level. The junior high school, viewed as a separate entity, was introduced into Alberta in 1919 and has been developed to provide an educational environment for adolescents and to assist pupils in the transition from non-departmentalized (one teacher for all subjects) elementary schools to departmentalized (one teacher for each subject) high schools. The curriculum consists of compulsory

core subjects, partially integrated or blocked, and exploratory subjects which are offered as electives. The scope and sequence approach and a unit method of organization are all features of the junior high school curriculum as envisaged by the Department of Education.

From the above description it might appear that junior high schools throughout Alberta were of the typical Grade VII, VIII and IX organizational pattern. In practice it has been found that due to the variations in numbers of pupils, physical facilities and educational philosophies prevalent within local school systems, the junior high school organization has to be flexible and able to meet the demands of various situations. Local school systems thus, while retaining the basic curriculum of the junior high school, have organized the local staffs in such ways as to develop a variety of organizational patterns.

Since the Grade IX pupils all write the High School Entrance Examination administered by the Department of Education, the placement of the Grade IX class within the school organization is of great concern to many principals. This concern has resulted in producing four common methods of providing for the instruction of Grade IX classes within the general framework of school organizations. These are as follows: (1) placing the Grade IX classes in a pattern whereby the

grade is taught by a single teacher; (2) placing Grade IX in an organizational pattern which allows the Grade IX teacher to teach students in Grade VII and VIII in addition to high school grades; (3) organizing Grades VII, VIII and IX in such a manner as to allow the Grade IX teacher to teach in all three grades; and (4) placing Grade IX with the high school organization so that the Grade IX teacher may also teach at the high school level.

The grouping may or may not be done on the basis of physical facilities, and the organizational patterns are such that any of the above could be found in schools of varying types of physical organization. A school in which Grades I to XII are included could be organized into any one of the four patterns described. In this study the organizational patterns are defined in terms of variations in staff allocation within the grades from VII through XII. It may be assumed that the junior high school concept as envisioned by the Department of Education is inherent in each of these organizational structures, and that in this respect there will be some similarities among the four groups.

The placement of the Grade IX class within the school organization is of paramount importance to this study. As described above, it can appear in any one of the four school organizational patterns. It was assumed in this study that

the placement of the Grade IX class within each of the four organizational patterns resulted in a different type of learning experience for the Grade IX pupils, which may be reflected in differences in achievement. It was this assumption which was examined.

The placement of Grade IX in the organizational pattern of a particular school is usually dictated by such factors as: tradition, local policies, enrollment of Grade IX pupils, size of school, availability of buildings, and staff qualifications. There has been very little serious consideration given to the placement of the Grade IX classes on the basis of academic achievement, and there appears to be very little evidence to support the placement of the Grade IX class in any of the four organizational patterns described on the basis of academic achievement.

I. THE PROBLEM

Statement of the problem. The purpose of this study was to investigate the achievement of Grade IX pupils in each of four organizational patterns. The problems examined were:

Major problems.

1. Is there a significant difference in the total achievement of Grade IX pupils who attended classes in each of the

four named organizational patterns?

2. Is there a significant difference in achievement of Grade IX pupils in individual subjects in each of the four named organizational patterns?

Minor problems.

1. Is there a significant difference in the total achievement of pupils in schools where Grade IX is taught by one teacher only and the total achievement of pupils in schools where the Grade IX class is taught by more than one teacher but by teachers who teach Grade IX only?
2. Is there a significant difference in the total achievement of Grade IX pupils taught by teachers who also teach subjects in Grades VII, VIII and high school in large schools and Grade IX taught under similar conditions in small schools?
3. Is there a significant difference in the total achievement of Grade IX pupils taught by teachers who also teach Grade VII and VIII, but not in high school, in non-city schools and Grade IX pupils taught under similar conditions in city schools?
4. Is there a significant difference in the total achievement of Grade IX pupils, taught by teachers who also teach in high school but not in Grades VII and VIII in large

schools, and Grade IX pupils taught under similar conditions in small schools?

Importance of the study. It is essential that some information regarding the relative achievement of Grade IX classes in the organizational patterns described be available to guide school administrators in deciding the placement of Grade IX classes. Much has been said with regard to the social needs of the adolescent pupils and of the unique contribution of the three-year junior high school to these needs, but there is little research evidence indicating any academic advantages of the three-year junior high school.

As a result of the current expansion of school systems many decisions must be made as to the placement of grades within organizational patterns. Some school districts have traditionally included Grade IX classes within the senior high school and are now faced with making a decision as to whether they should build a larger senior high school or a new building to house a three-year junior high school. Other school systems have a traditional practice of placing a single teacher in a Grade IX classroom to teach all subjects. Still other schools are currently organized in a manner such that a three-year junior high school organization exists. As can be seen from the background to this study there does not appear

to be a sound basis for any of the organizational structures so far as pupil achievement is concerned. This study may indicate that the placement of the Grade IX class in the organizational structure is related to pupil achievement. It is also of paramount importance to principals who are administering schools which contain pupils in all grades from I to XII or pupils in other grade combinations, to have specific information upon which they may base their decisions to allocate teachers to grades. The schools in Alberta usually include one of the following groups of grades: I-XII, I-XI, VII-XII, I-IX, IX-XII, or VII-IX. It is thus possible for principals to allocate teachers to grades in such a way that a variety of organizational patterns could exist within similar schools, or similar allocation could exist within different schools. This study will examine factors of achievement within the various organizational patterns; the findings may have implications for decision making when the school principal allocates teachers to the Grade IX class. It is perhaps in this area of local decision making that the results of this study may be useful.

Scope and limitations. This study was restricted to the 1963-64 school year and the achievement of the Grade IX pupils who wrote High School Entrance Examinations in June,

1964.

Many factors which are related to pupil achievement such as teacher qualifications, class size, socio-economic status of pupils, promotion policies of the school, availability of instructional aids and teacher mobility were not included in this study due to the difficulty of obtaining relevant data. It is felt that many of the above factors are peculiar to the specific school organization. In particular, teacher qualifications, promotion policies of the school, the availability of instructional aids and class size probably vary amongst the school organizations being examined.

Assumptions. It was assumed that:

1. Ability was measured by the SCAT test and that the ability rating given was not the cumulative effect of achievement.
2. Achievement was measured by the High School Entrance Examination.
3. The factors discussed--teacher qualifications, class size, socio-economic status of the pupils, promotion policies of the school, availability of instructional aids and teacher mobility--are contributory to the relationship between school organization and pupil achievement.

II. DEFINITIONS

Organizational patterns, as used in this study, refers to various methods of staff allocation that may be employed in schools which contain a variety of grade ranges. It is assumed in this definition that the functional organization of a school is based upon the grades or groups of grades in which specific teachers offer instruction. This definition, thus, may describe a sub-organization within the broader context of the school organization.

1. Organizational patterns

A. Grade IX only Pattern. This organizational pattern is one in which teachers of the six Grade IX examination subjects teach Grade IX only.

A_1 - the Grade IX only pattern in which there is one only Grade IX teacher.

A_2 - the Grade IX only pattern in which there are two or more teachers.

B. Junior-Senior High School Pattern. This organizational pattern is one in which the teachers of the Grade IX examination subjects also teach subjects in Grades VII or VIII and High School.

B_1 - the Junior-Senior High School pattern as found in

a large school.

B_2 - the Junior-Senior High School pattern as found in a small school.

C. Junior High School Pattern. This organizational pattern is one in which the teachers of the Grade IX examination subjects also teach subjects in Grades VII and VIII.

C_1 - the Junior High School organization located in a non-city area.

C_2 - the Junior High School organization located in an city area.

D. Senior High School Pattern. This organizational pattern is one in which the teachers of the Grade IX examination subjects also teach subjects in the High School.

D_1 - the Senior High School organization as found in a large school.

D_2 - the Senior High School organization as found in a small school.

2. Large school is defined as a school with a student population greater than 300.

3. Small school is defined as a school with a student population of 300 or fewer.

4. City School area is one located in a population centre of 10,000 or greater.

5. Non-City School area is one located in a population centre of less than 10,000.

6. High School Entrance Examinations are those examinations prepared and administered to Grade IX pupils in the Province of Alberta by the High School Entrance Examination Board of the Department of Education.

7. Grade IX Examination Subjects are those subjects (mathematics, science, language, literature, social studies and reading) for which a High School Entrance Examination must be written at the end of the school year.

8. Ability Rating refers to the measurement which is made by the SCAT (School and College Ability Test) test which is administered to all Grade IX students by the High School Entrance Board of the Department of Education.

9. Academic Achievement refers to the scores which a Grade IX pupil receives on the High School Entrance Examinations.

10. Total Achievement is the total score a student receives on the six Grade IX examination subjects.

III. ORGANIZATION OF THE THESIS

The first chapter of the thesis has presented a statement of the problem together with a discussion of scope and limitations, of the significance of the problem, and an outline of relevant definitions. The next chapter includes a review of related literature in three major areas: (1) Studies relating to School Organization pattern, (2) studies relating school organization to pupil achievement, and (3) studies of variables related to the performance of Alberta pupils on Grade IX examinations. The population of schools defined by the organizational patterns under study, the sample selected for this study, the sources of data, and the analysis to which the data were subjected are described in Chapter III. Chapter IV includes a report of the results of the analyses which were applied to the data; the final chapter contains a summary and discussion of the findings.

CHAPTER II

REVIEW OF LITERATURE

A review of the literature which deals with pupil achievement as an output of a school organizational pattern reveals that there has been very little research into this sphere; the outcomes of research which has been done have been inconclusive. Much of the research into school organizational patterns at the Grade IX level deals with the social advantages and disadvantages which different school organizational patterns offer.

This chapter consists of three parts. The first is a review of some of the literature dealing with the vertical organization of school grades, the second is a review of the literature which discusses the relationship between school organization and achievement, and the third portion consists of a review of the literature which discusses the relationship of the achievement of Grade IX pupils to specific teacher or organizational characteristics. Some of the literature reviewed does not bear directly upon the specific problems of patterns of teacher organization and student achievement; rather, it bears to a greater extent upon the general problem of vertical organization or upon the general interest prevalent in staff utilization and new methods of school organization.

I. VERTICAL ORGANIZATION OF SCHOOLS

Anderson is of the opinion that recent research upon which policies of staff utilization and deployment must be based, at least temporarily, is woefully inadequate and that what can be concluded from a review of the literature is that existing arrangements do not seem to satisfy any criterion for a school organization and a program consistent with the needs of pupils and relevant to the demands of the modern world.[1] Many organizational methods are being explored, and much is being written about the experiences of educational administrators with the new organizations.

The current interest in staff utilization and deployment is evident in the educational literature of today. While much of the interest lies in scheduling practices, team teaching, the use of specialists in the fields of audio-visual aids, educational television and a general concern about improved horizontal organization, interest is also being expressed in the vertical organization or the division of the years of public education into various distinct organizations each composed of a specific number of grades.

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[1] R.H. Anderson, "Organizational Character of Education: Staff Utilization and Deployment," Review of Educational Research, 34:455-69, October, 1964.

In the United States the introduction of the 6-2-2-2 pattern of school organization is being heralded by some as a panacea for the educational ills of the 6-3-3 and 8-4 organizations. It is claimed that by grouping the grades IX and X in an organization separate from the grades VII-VIII and XI-XII, many special needs of the adolescents in grades IX and X can be met. It appears, however, that this new type of organization is possible only in schools enrolling a large number of Grade X and XI students since the advantages claimed include more teacher specialization, a broader range of course offerings and better library and other instructional facilities.[2]

Another advantage claimed for this organization is that it provides more opportunities for pupils to develop as leaders. With Grades VI, VIII, X, and XII all representing a senior class in each of the respective organizations, the pupils are offered more leadership opportunities. This advantage is one which is often proffered by the proponents of the three year Junior High School. It is further claimed that in the 6-2-2-2 pattern the pupil in each organization, representing a narrow range of grades and chronological age, will present fewer

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[2] C.J. Manone and A.A. Glotterhorn, "The 9-10 School: A Novelty or a Better Answer?" Educational Leadership, 23:285-289, January, 1966.

discipline problems since there will not be widely divergent interests and activities exhibited by the pupils.

Alexander and Williams propose a model middle school for children between the ages of ten and fourteen.[3] This model school would be organized on a flexible basis which would allow most pupils to remain in the middle school for four years while others would move through the organization at a faster or slower pace in keeping with the provisions of vertical acceleration through any curriculum area. It is essential to these educators that this Middle School should not be referred to as a "Junior" high school but as a school with a status of its own.

Margaret Mead, in questioning what school organization is best for pupils in that stage of development between childhood and adolescence, seems to feel that there is no reason to support the assumption that a junior high school, separate and distinct from both elementary and senior high school, is necessary because of the unique characteristics of the age group involved in junior high school grades. She argues that the grades included in the junior high school were postulated on age and not on size, strength or stage of puberty, and she

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[3] W.M. Alexander and E.L. Williams, "Schools For the Middle School Years," Educational Leadership, 23:217-223, December, 1965.

contends that emotional and discipline problems are multiplied because of the junior high schools.[4]

It is felt by Frey that if proper articulation between various vertical school organization is maintained it matters very little what type of organizations are devised. He states that learning, being a continuum, should not be segmented in the school situation and that through proper articulation between grades I through XII the problems of various school organization patterns may be met.[5]

As may be seen from the above reports of articles dealing with staff utilization and school organization the schools are constantly being evaluated. A re-evaluation of organizational patterns which have existed in Alberta schools for the past few decades may be timely.

II. SCHOOL ORGANIZATION AND PUPIL ACHIEVEMENT

Greenfield reported in 1963 that organization in educational systems has significant effects upon achievement as a

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[4] Margaret Mead, "Early Adolescence in the United States," The Bulletin of the National Association of Secondary School Principals, 49:5-10, April, 1965.

[5] Sherman H. Frey, "Articulation Between the Junior and Senior High School," The Bulletin of the National Association of Secondary School Principals, 47:35-43, October, 1963.

system output.[6] The designation of pupil achievement as a significant output of an educational organization by Greenfield led him to accept the Grade IX achievement score on the Alberta High School Entrance Examination as a valid measure of productivity. It was also reported by Greenfield that in a systems analysis of a school organization two variables which account for a large variation in achievement were (1) type of secondary school (a positive relationship indicated that higher scores were obtained in comprehensive schools); and (2) grades included in the secondary school (the schools that include from Grade I to Grade XII did not do as well as all other schools combined).

In relation to the effectiveness of the Junior High School, or the 6-3-3 plan of school organization, one of the most careful studies of pupil achievement in the Junior High School was carried out by Mills in six Massachusetts school systems; three of these were organized on the Junior High School plan and three on the Junior-Senior High School plan. Mills found that in the Junior High School pupils devoted less time to the fundamentals but that on the achievement

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[6] Thomas Barr Greenfield, "Systems Analysis in Education: A Factor Analysis and Analysis of Variance of Pupil Achievement," (unpublished Doctoral dissertation, University of Alberta, 1963).

tests they did as well as pupils in the 8-4 schools.[7] Other studies by Smith at Syracuse and by Beatley in Massachusetts have yielded similar results.[8,9] In studies prior to 1940 there appeared to be no significant differences in achievement of pupils in the 6-3-3 organizational structure and the 8-4 organizational structure.

Reece, in discussing his study of the three year Junior High School versus the six year Junior-Senior High School, states that from the data obtained in his research it was concluded that neither type of secondary school organization is superior in terms of academic or reading achievement of ninth grade pupils. His findings show no statistical differences in the academic achievement of 696 ninth grade pupils in the separate Junior High School compared with 314 ninth grade pupils in the combined Junior-Senior High School.[10] These

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[7] H.C. Mills, "The Comparative Efficiency of the 8-4 and 6-3-3 Systems of Schools," The Encyclopedia of Educational Research 1950. Walter S. Monroe, Editor, p. 637.

[8] H.P. Smith, "The Relative Efficiency of the Junior High School vs The Conventional Eight Grade Type of School," Journal of Education Research, 29:276-280, December, 1935.

[9] Bancroft Beatley, "Achievement in the Junior High School," The Encyclopedia of Educational Research 1950. Walter S. Monroe, Editor, p. 637.

[10] Jerald L. Reece, "The Three Year Junior High School vs. the Six Year Junior-Senior High School," The Bulletin of the National Association of Secondary School Principals, 46:23-33, February, 1962.

findings are similar to those of previous research which has been conducted in the past forty years.

There has been some research directed at discovering differences in academic achievement between the traditional 8-4 plan of organization and the reorganized schools (6-6 or 6-3-3 plans) but Reece reports that to date no research has successfully established one type of organization as being superior to others in terms of achievement of pupils in Grades VII, VIII and IX.

Loretan reports, however, that repeated surveys by respected committees have shown that ninth grade students of Junior High Schools including students completing the three year Junior High course in two years do better than comparable ability groups doing their work in the first year of academic High School.[11] It is further reported by Gruchen, Tompkins, Trump and Rae that the responses to questionnaires sent to 4,260 principals by the N.A.S.S.P. committee on Junior High School education in November 1958, suggest that about three-fourths of the specialists recommend that teachers be assigned specifically either to Junior or Senior High School units, but not to both, since the needs of the pupils in the Junior and

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[11] Joseph O. Loretan, "A Reaffirmation of Faith in the Junior High Schools," The Bulletin of the National Association of Secondary School Principals, 44:21-32, November, 1960.

Senior High Schools are quite different.[12]

Conant has assimilated these divergent reports in stating that,

> On the United States scene there is no consensus whatever among experienced educators as to the placement of Grade IX in the organizational framework. Should it be the top grade in a three year Junior High School, or the bottom grade in a four year Senior High School? I know of similar communities which recently arrived at opposite conclusions.[13]

Clute and Faunce see definite advantages in the Junior High School organization and state that although sound learning takes place on much the same basis at every level of education, violations of the principle of learning are more often found in secondary schools and colleges than in Elementary and Junior High Schools.[14] It is claimed by these authors that Junior High School teachers are often handicapped by the openly expressed efforts of the high school faculties to control the Junior High School promotion policy. Senior High

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[12] W.T. Gruchen, H. Tompkins, J.L. Trump and V. Rae, "The Junior High School Grades in the Six Year High School," The Bulletin of the National Association of Secondary School Principals, 44:46, November, 1960.

[13] James B. Conant, Recommendations for Education in the Junior High School Years, (Princeton, N.J.: Educational Testing Services, 1960), p. 11.

[14] Marcel J. Clute and Roland C. Faunce, Teaching and Learning in the Junior High School, (San Francisco: Wadsworth Publishing Company Inc., 1961), p. 25.

School teachers and principals do not want pupils of low achievement passed on to them, and to the extent that the Junior High School is a mere appendage to the upper school it may have difficulty resolving the problems of individual differences.

P.P. Brimm states that "there is very little objective research evidence to support either the 6-6 or 6-3-3 plans. Opinion surveys of administrators and teachers however, usually show a preference for the 6-3-3 plan."[15]

III. FACTORS RELATED TO GRADE IX ACHIEVEMENT

Many factors in the organizational structure of a school contribute to the achievement level of the pupils in a school. Such factors as number of grades in each classroom, and certain teacher qualifications have been found to be related to pupil achievement.

Truckey investigated the relationship between achievement and class organization as defined by number of grades assigned to each room containing Grade IX pupils.[16] Truckey

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[15] P.P. Brimm, The Junior High School, (Washington, D.C.: The Centre for Applied Research in Education Inc., 1963), p. 93.

[16] Lawrence Andrew Truckey, "Comparison of Achievement of Grade IX Students in Selected Single Grade and Multi-Grade Classes in Alberta," (unpublished Master's thesis, University of Alberta, 1964).

removed the effects of ability on achievement as measured by the Grade IX examinations by randomly casting out cases until the mean level of ability of each group was equalized. He concluded that double grade students achieve higher than students in single grades or mixed grades and that single grade pupils achieve significantly higher than do pupils in mixed grade classes. Grade IX students in mixed grades of Grade IX and X achieve higher than those in mixed grades of VIII and IX.

Lindstedt reported investigation of the relationship between pupil achievement in Grade IX mathematics and characteristics of Grade IX mathematics teachers: teaching experience, years of education, educational background in the subject area, and subject preference.[17] He found that teachers with ten or more years of experience are more competent in terms of pupil achievement than teachers with less experience; teachers with four or more years of education are more competent than teachers with less education; teacher competence is increased consistently when years of education are combined with years of experience; the number of university mathematics courses taken is not reflected in any significant difference

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[17] Axel Sidney Lindstedt, "An Analysis of the Relationship Between Certain Qualifications of Grade IX Mathematics Teachers in Alberta Schools and the Results of Their Students in the Final Examination for the Year 1957-58," (unpublished Master's thesis, The University of Alberta, 1960).

in Grade IX mathematics achievement; and that teachers who prefer the mathematics-science field have pupils with a higher average standing in mathematics. Lindstedt also reported that although city teachers surpass non-city teachers in years of professional training and are more favorably placed in their subject preference, there is no significant difference in the achievement of city Grade IX pupils and non-city Grade IX pupils in mathematics.

Eddy examined the relationship between certain teacher characteristics and Grade IX social studies achievement.[18] His investigation found a significant positive relation between Grade IX social studies marks and the following teacher characteristics: number of years of training, number of university level courses taken in the social studies, number of years of teacher experience, number of teachers in the school, and subject-field preference of teachers. Eddy also reported that the social studies marks of city students were significantly higher than the social studies marks of non-city students.

The research which deals with the school organizational

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[18] Wesley Percy Eddy, "A Study of Certain Characteristics of Teachers in Relation to Grade IX Social Studies Achievement," (unpublished Master's thesis, University of Alberta, 1962).

pattern and its relationship to student achievement indicates that the evaluation of an organization or system may be measured by the single criterion of pupil achievement as an output. It is evident, however, that just as pupil achievement is not a valid single criterion for judging a school system, the organization of a school is also a case of multiple factors. The reports of the research dealing with teacher qualifications and experience and with multiple grade placement, serve notice that there are many sources of influence on pupil achievement. Some aspects which have not been investigated but which possibly affect pupil achievement in Grade IX are promotion policies of schools, the socio-economic background of the Grade IX pupils and the social values inherent in a learning situation. The need for further study of factors affecting achievement is evident; this study was designed to explore some avenues that have not been explored explicitly in previous research.

CHAPTER III

RESEARCH DESIGN

The design of this study was such that most of the schools which enroll Grade IX pupils in Alberta were included in the population. The examination of schools which fall into the four organizational patterns and the eight sub-groups was made after a specific set of criteria was applied to the selected schools. The method of applying the criteria, the selection of the schools, and characteristics of these schools are described in this chapter.

I. SELECTION OF SAMPLE

The students included in this investigation were selected from a population including all those who wrote Alberta Department of Education Grade IX Examinations in June 1964, with the exception of those students who attended private schools, schools outside of Alberta, correspondence schools, schools in which Grade IX was taught in the same class as another grade or schools maintained by correctional institutions.

The sample of 10 percent of the described population was taken using the following procedures:

1. The Department of Education record cards for all Grade IX students in the defined schools were collected and placed into the appropriate school organizational pattern.
2. A random sample, consisting of 10 percent of the students in each organizational pattern, was chosen. A slight deviation from this sampling technique was made in the case of three schools which had a Grade IX enrollment of less than seven. In the case of these three schools one student was randomly selected from each school. This deviation was made so that the sample would contain at least one pupil from each school included in the study.

II. CHARACTERISTICS OF SCHOOLS

The schools were divided into four organizational patterns, as defined by teacher allocation, for the purposes of examining the major problems. These four organizational patterns were broken into eight sub-categories for use in dealing with the minor problems of the study. Table I presents the description and number of the schools in each organizational pattern and also in each sub-category. The Junior High School organization with 208 schools represents about 45 percent of the total schools in this study. The schools in each of the

TABLE I

DESCRIPTION AND NUMBER OF SCHOOLS BY GROUP AND SUB-GROUP

Group	Sub-Group	Description	No. of Schools
A Grade IX only		Students in schools where Grade IX is taught by teachers teaching Grade IX only.	86
	A_1 One Grade IX teacher	Portion of Group A where there is only one Grade IX teacher.	53
	A_2 Two or more Grade IX teachers.	Portion of Group A where there is more than one Grade IX teacher.	33
B Junior-Senior High School		Students in schools where Grade IX is taught by teachers who are also teaching in Grades VII, VIII and high school.	88
	B_1 large schools	Portion of Group B in large schools.	44
	B_2 small schools	Portion of Group B in small schools.	44
C Junior High School		Students in schools where Grade IX is taught by teachers who are also teaching in Grades VII and VIII but not in high school.	208
	C_1 Non-city Schools.	Portion of Group C in non-city area.	94
	C_2 City Schools.	Portion of Group C in city area.	114

TABLE I (continued)

Group	Sub-Group	Description	No. of Schools
D Senior High Schools		Students in schools where Grade IX is taught by teachers who are also teaching high school grades but not Grades VII or VIII.	89
	D_1 Large schools.	Portion of Group D in large schools.	40
	D_2 Small schools.	Portion of Group D in small schools.	49

other three organizational patterns represent about 18 percent of all schools in this study.

The data with regard to the grades taught in the schools examined may be found in Table II. In this table the grades included in the school are presented for descriptive purposes only. It is shown that each of the organizational patterns and sub-groups examined may occur in schools with different ranges of grades. The Grade I to XII school, with a variety of organizational patterns, is the most numerous of the schools in this research project.

In Table III the number of pupils enrolled in the schools is presented. It might be noted that about 57 percent of the schools enrolled 300 or more pupils. There are only about 22 percent of the schools which enrolled fewer than 200

TABLE II

NUMBER OF SCHOOLS IN EACH ORGANIZATIONAL PATTERN BY GRADES INCLUDED IN SCHOOL

	Grade IX Only		Junior-Senior High School		Junior High School		Senior High School	
Grades Includ-ed In School	Group A_1 One Grade IX Teacher	Group A_2 Two or More Grade IX Teachers	Group B_1 Large School	Group B_2 Small School	Group C_1 Non-City School	Group C_2 City School	Group D_1 Large School	Group D_2 Small School
1-12	31	12	33	25	23	1	28	29
1-11	4	0	0	9	2	0	2	10
7-12	0	6	7	5	8	4	3	4
1-9	14	4	0	0	49	86	0	0
9-12	0	0	0	0	0	0	7	3
7-9	0	6	0	0	7	20	0	0
Other	4	5	4	5	5	3	0	3
Total	53	33	44	44	94	114	40	49

TABLE III

DISTRIBUTION OF SCHOOLS IN EACH ORGANIZATIONAL PATTERN BY NUMBERS OF PUPILS ENROLLED

Number of Pupils Enrolled	Grade IX Only		Junior-Senior High School		Junior High School		Senior High School	
	Group A_1 One Grade IX Teacher	Group A_2 Two or More Grade IX Teachers	Group B_1 Large School	Group B_2 Small School	Group C_1 Non-City School	Group C_2 City School	Group D_1 Large School	Group D_2 Small School
Over 500	1	13	15	0	12	52	11	0
401-500	2	8	10	0	9	31	6	0
301-400	15	5	19	0	18	20	23	0
201-300	16	6	0	27	29	8	0	32
101-200	17	1	0	16	24	3	0	17
100 or fewer	2	0	0	1	2	0	0	0
Total	53	33	44	44	94	114	40	49

pupils, and only five of the 471 schools included in this study enrolled fewer than 100 pupils.

The number of Grade IX pupils enrolled in the schools is presented in Table IV. It is shown that 307 of the 471 schools enroll fifty or fewer Grade IX pupils. This leaves only 164 or about 35 percent of the schools which enroll more than fifty Grade IX pupils in the schools. There are forty schools which enroll 125 or more pupils in Grade IX; these schools are mainly in the Junior High School pattern.

III. SOURCE OF THE DATA

The proper categorization of the schools by organizational pattern was determined from information obtained from the Form 'A' cards sent to the Examination Branch, Department of Education, by all schools in which Grades VII or higher are included. These cards indicated what subjects are taught by the Grade IX teachers.

The pupil achievement scores were available on IBM student record cards obtained from the Alberta Department of Education. These record scores indicated the pupil achievement in literature, language, social studies, mathematics, science and reading, as well as total achievement and percentile scores for the SCAT. The scores for language, social studies, mathematics and science are based upon 100 marks. The scores

TABLE IV

DISTRIBUTION OF SCHOOLS IN EACH ORGANIZATIONAL PATTERN BY NUMBERS OF GRADE IX PUPILS ENROLLED

Grade IX Enrollment	Grade IX Only		Junior-Senior High School		Junior High School		Senior High School	
	Group A_1 One Grade IX Teacher	Group A_2 Two or More Grade IX Teachers	Group B_1 Large School	Group B_2 Small School	Group C_1 Non-City School	Group C_2 City School	Group D_1 Large School	Group D_2 Small School
0-25	37	1	7	36	47	2	5	33
26-50	16	5	24	8	26	31	19	10
51-75	0	15	7	0	7	26	5	6
76-100	0	4	3	0	8	13	6	0
101-125	0	3	2	0	5	12	2	0
125 or more	0	5	1	0	1	30	3	0
Total	53	33	44	44	94	114	40	49

for literature and reading are based upon 50 marks. These scores are the standardized or transmuted scores and are based upon a frequency distribution which approximates the normal curve.

IV. METHOD OF ANALYSIS

The data for each of the groups described were subjected to an analysis of covariance to determine whether or not there were significant differences in achievement. This analysis involved an F test to indicate significant differences and was followed by a "t" test, where significant differences existed, applied to means taken two at a time. In applying F and "t" tests, the .05 level of significance was adopted.

In the treatment of the minor problems no F test was employed since the major concern was a comparison between two groups rather than amongst the eight sub-groups involved. A "t" test was applied to the means of the sub-groups to be compared. The accepted level of significance in the minor problems was .05.

V. ANALYSIS OF DATA

The analysis of covariance was carried out through the medium of a computer; the particular program which was used

computes a covariance analysis for a single-factor experiment such as this research problem. Measures were available for the four major and eight minor groups on the criterion, achievement, and on the covariant, intelligence. The analysis was carried out on the basis of adjustment using the pooled regression equation. That is, if it is found that the regressions based on the separate groups is the same as that based on the total group, except for sampling variability, the effects of the different organizational patterns can be disregarded. Conversely, differences between those regressions not attributed to sampling error may be regarded as due to the placement of the school within one of the organizational patterns.

By using this method the achievement for each sub-group was analysed separately. In the major problem the total achievement, as well as the achievement in each of the six individual subjects, for each of the four school categories was analysed. The dependent or criterion variable was different for each analysis. It consisted of the transmuted score for each individual subject or for total achievement. The covariant in all cases was the percentile rating of the SCAT score.

All the assumptions underlying the analysis of variance such as: (1) homogeneity of variance, (2) that the

distribution of the variables in the population from which the samples were drawn are normal and (3) that the effects of various factors on the total variation are additive, are made. Winer indicates...

> In addition to the assumption underlying the analysis of variance approach, there are assumptions about the regression effects. First it is assumed that treatment effects and regression effects are additive. Implicit in this is the assumption that regressions are homogeneous. Second, it is assumed that the residuals are normally and independently distributed with zero means and the same variance. Implicit in this is the assumption that the proper form of regression equation has been fitted. If a linear regression is used when the true regression is curvilinear, then the assumptions made with respect to the residuals will generally not hold.[19]

For each single group the following information pertinent to this analysis was included in the output:

(a) Means for each variable, both independent and criterion.

(b) The within group variance estimate.

(c) The total variance of the criterion.

(d) The adjusted means for each criterion variable.

(e) The F ratio testing the differences between group means for each variable.

(f) The probability level.

When an F ratio indicated a significant difference at the .05 level the adjusted means were examined through the use

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[19] B.J. Winer, Statistical Principles in Experimental Design, (New York: McGraw-Hill Book Co., 1962), p. 586.

of a "t" test. Ferguson states that if the F test does not lead to the rejection of the null hypothesis, no further analysis is necessary but when the null hypothesis is rejected a comparison of means two at a time using a "t" test will indicate when a significant difference exists between groups.[20]

The purpose of this analysis was to determine what part of the variance of the criterion variable for each subgroup could be attributed to the organizational placement of the Grade IX class within the school when the effects of intelligence were accounted for in the pooled regression equation on which the analysis was based.

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[20] George A. Ferguson, Statistical Analysis in Psychology and Education, (New York: McGraw-Hill Book Company, 1959), p. 238.

CHAPTER IV

RESULTS OF THE ANALYSIS

The analysis of the problems of this study involved an examination of the significance of differences in achievement of pupils in various organizational patterns. The tables and related discussion in this chapter present the essential results of the analysis of differences in total achievement and in achievement in the individual examination subjects among the four major groups and also among eight sub-groups.

I. RESULTS OF ANALYSIS: MAJOR PROBLEMS

The analysis of data indicated that a wide variation did exist in the independent variable, intelligence, within the four groups. A comparison of the mean intelligence percentiles for the four groups in Table V revealed that the mean percentile of 45.79 of the pupils attending Grade IX in a High School organization was 6.53 percentile points below the mean intelligence percentile of pupils attending Grade IX in a Junior High School organization. Pupils attending Grade IX in the Grade IX only and the Junior-Senior High School organizations scored mean intelligence percentiles of slightly over 47.

TABLE V

MEAN INTELLIGENCE PERCENTILE FOR FOUR MAJOR GROUPS

Group	Mean Intelligence Percentile	Number in Group
Grade IX only	47.14	366
Junior-Senior High School	47.45	299
Junior High School	52.32	1,345
High School	45.79	405

Total achievement. The great difference in the mean intelligence percentile for the four groups is reflected in unadjusted means, of the total achievement, for the four groups as presented in Table VI. The unadjusted mean of the total achievement of Junior High School Grade IX pupils was 291.79 or 21.08 points above the mean of total achievement of High School Grade IX pupils. After the effects of intelligence were removed, the unadjusted total achievement means indicated a range of only 7.61 points. It was these adjusted means which were analysed.

In Table VII the summary of the adjusted analysis of variance for total achievement is presented. The adjusted F ratio is 4.94; the value of F required for significance at the .01 level is 3.78. It is concluded that there is a significant

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[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

[illegible]

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difference in the total achievement of the Grade IX pupils in the four organizational patterns.

TABLE VI

UNADJUSTED AND ADJUSTED MEANS OF PUPIL TOTAL ACHIEVEMENT FOR FOUR MAJOR GROUPS

Group	Number	Unadjusted Means	Adjusted Means
Grade IX only	366	279.49	285.05
Junior-Senior High School	299	278.60	283.50
Junior High School	1,345	291.79	286.67
High School	405	270.71	279.06

TABLE VII

SUMMARY OF ADJUSTED ANALYSIS OF VARIANCE OF TOTAL ACHIEVEMENT FOR FOUR MAJOR GROUPS

Source of Variation	Degrees of Freedom	Mean Square	Adjusted F Ratio
Group	3	6160.25	
Within	2410	1246.82	4.94
$F_{(\text{Crit.})}^{.01} = 3.78$			

Since the F test indicated that a significant difference existed between the total achievement for the four major groups, the means were compared two at a time using a "t" test.

The results of the "t" tests are presented in Table VIII. The Grade IX pupils from the Grade IX only pattern achieved higher than the Grade IX pupils from the High School pattern. This difference was significant at the .01 level. There was also a significant difference at the .001 level between the mean total achievement of the Grade IX pupils from the Junior High School pattern and the Grade IX pupils from the High School pattern; the Junior High School students achieved an adjusted mean score 7.61 points higher than that of the Grade IX pupils from the High School pattern. No significant difference was found when the total achievement means of students from the other organizational patterns were compared.

TABLE VIII

COMPARISON OF ADJUSTED TOTAL ACHIEVEMENT MEANS BY USE OF "t" TEST

Groups	"t"	Higher Group Mean	Significance
Grade IX only and Junior-Senior High School	.33	Grade IX only	N.S.D.
Grade IX only and Junior High School	.79	Junior High School	N.S.D.
Grade IX only and High School	2.61	Grade IX only	.01 level
Junior-Senior High School and Junior High School	1.43	Junior High School	N.S.D.
Junior-Senior High School and High School	1.64	Junior-Senior High School	N.S.D.
Junior High School and High School	3.87	Junior High	.001 level

Literature achievement. The transmuted score for literature was based on a maximum score of 50. Table IX presents the unadjusted and adjusted means of pupil achievement in Grade IX literature. The unadjusted means vary from a high of 29.23 obtained by Grade IX pupils in the Junior High School pattern to a low of 26.87 obtained by Grade IX pupils in the Senior High School pattern. After the means were adjusted for the effects of intelligence they varied from a high of 28.74 which was obtained by Junior High School Grade IX pupils to a low of 27.68 in the High School pattern.

TABLE IX

UNADJUSTED AND ADJUSTED MEANS OF PUPIL LITERATURE ACHIEVEMENT FOR FOUR MAJOR GROUPS

Group	Number	Unadjusted Means	Adjusted Means
Grade IX only	366	28.11	28.66
Junior-Senior High School	299	27.66	28.14
Junior High School	1,345	29.23	28.74
High School	405	26.87	27.68

In Table X the summary of the adjusted analysis of variance for pupil achievement in literature is presented. The adjusted F ratio of 5.25 is significant at the .01 level.

TABLE X

SUMMARY OF ADJUSTED ANALYSIS OF VARIANCE OF PUPIL LITERATURE ACHIEVEMENT FOR FOUR MAJOR GROUPS

Source of Variation	Degrees of Freedom	Mean Square	Adjusted F Ratio
Group	3	129.90	
Within	2410	24.74	5.25
	$F_{(Crit.)}$ .01 = 3.78		

Since the difference in achievement in literature was found to be significant at the .01 level, the comparison of the adjusted means two at a time was made by using a "t" test. The results of this comparison are shown in Table XI. The pupils attending Junior High Schools achieved higher in literature than did pupils from Junior-Senior and Senior High Schools. The mean score in the Junior High School pattern was 1.06 points above the lowest mean, that of High School pupils. This difference is significant at the .001 level. The difference between literature achievement of pupils in the Grade IX only pattern over pupils attending Junior-Senior High Schools is significant at the .01 level. There is no significant difference in the mean achievement in literature amongst the schools in other categories.

TABLE XI

COMPARISON OF ADJUSTED MEANS OF PUPIL LITERATURE ACHIEVEMENT BY USE OF "t" TEST

Groups	"t"	Higher Group Mean	Significance
Grade IX only and Junior-Senior High School	1.3	Grade IX only	N.S.D.
Grade IX only and Junior High School	.27	Junior High School	N.S.D.
Grade IX only and High School	2.65	Grade IX only	.01 level
Junior-Senior High School and Junior High School	1.89	Junior High School	N.S.D.
Junior-Senior High School and High School	1.26	Junior-Senior High School	N.S.D.
Junior High School and High School	3.77	Junior High	.001 level

Language achievement. Table XII presents data which facilitates the comparison of language achievement of pupils in Grade IX in four organizational patterns. The unadjusted means vary from a high of 58.40 obtained by Junior High School pupils to a low of 54.54 obtained by High School pattern pupils. The adjusted means, which do not reflect the effects of intelligence, vary from a high of 57.91 obtained by Junior-Senior High School Grade IX pupils to a low of 55.97 obtained by Grade IX pupils in the Grade IX only pattern.

TABLE XII

UNADJUSTED AND ADJUSTED MEANS OF PUPIL LANGUAGE ACHIEVEMENT FOR FOUR MAJOR GROUPS

Group	Number	Unadjusted Means	Adjusted Means
Grade IX only	366	54.92	55.97
Junior-Senior High School	299	56.97	57.91
Junior High School	1,345	58.40	57.43
High School	405	54.54	56.13

The summary of the adjusted analysis of variance of pupil achievement in language is shown in Table XIII. The difference in achievement is not significant at the .01 level but it is significant at the .05 level.

TABLE XIII

SUMMARY OF ADJUSTED ANALYSIS OF VARIANCE OF PUPIL LANGUAGE ACHIEVEMENT FOR FOUR MAJOR GROUPS

Source of Variation	Degrees of Freedom	Mean Square	Adjusted F Ratio
Group	3	390.18	
Within	2410	120.50	3.24
$F_{(Crit.)}$	.01 = 3.78 .05 = 2.60		

The results of the comparison of the means of language achievement for the four groups taken two at a time are shown in Table XIV. The Junior-Senior High School organization attained the highest adjusted mean; this was found to be significant at the .05 level in comparison with the Grade IX only, the Junior High School and the High School organizations. The Junior High School achievement was found to be significant at the .05 level over the High School achievement.

TABLE XIV

COMPARISON OF ADJUSTED MEANS OF PUPIL LANGUAGE ACHIEVEMENT BY USE OF "t" TEST

Groups	"t"	Higher Group Mean	Significance
Grade IX only and Junior-Senior High School	2.24	Junior-Senior High School	.05 level
Grade IX only and Junior High School	2.25	Junior High School	.05 level
Grade IX only High School	.202	High School	N.S.D.
Junior-Senior High School and Junior High School	2.05	Junior-Senior High School	.05 level
Junior-Senior High School and High School	2.09	Junior-Senior High School	.05 level
Junior High School and High School	2.09	Junior High School	.05 level

Social Studies achievement. The means of Grade IX pupil achievement in social studies for the four groups are presented in Table XV. The unadjusted means show wide variations from a low of 53.35 obtained by pupils in a High School organization to a high of 59.00 obtained by pupils in a Junior High School organization. The adjusted means indicate a difference of only 2.99 points between the Junior High School pupil achievement and the High School pupil achievement.

TABLE XV

UNADJUSTED AND ADJUSTED MEANS OF PUPIL SOCIAL STUDIES ACHIEVEMENT FOR FOUR MAJOR GROUPS

Group	Number	Unadjusted Means	Adjusted Means
Grade IX only	366	56.43	57.29
Junior-Senior High School	299	54.43	55.40
Junior High School	1,345	59.00	57.99
High School	405	53.35	55.00

Table XVI shows the summary of the adjusted analysis of variance for pupil achievement in social studies. The adjusted F ratio of 12.309 is considerably above that of 3.78 which is significant at the .01 level. It is concluded that there are significant difference in social studies achievement among the four groups.

TABLE XVI

SUMMARY OF ADJUSTED ANALYSIS OF VARIANCE OF PUPIL SOCIAL STUDIES ACHIEVEMENT FOR FOUR MAJOR GROUPS

Source of Variation	Degrees of Freedom	Mean Square	Adjusted F Ratio
Group	3	1249.74	
Within	2410	101.53	12.309

$F_{(Crit.)}.01 = 3.78$

The comparison of the adjusted means of pupil achievement in social studies, two at a time by a "t" test, is presented in Table XVII. There was no significant difference in the mean achievement between pupils in the Junior High School and the Grade IX only patterns nor between pupils in the Junior-Senior High School and the High School patterns. The pupils in the Junior High School pattern achieved significantly higher than did pupils in the High School and the Junior-Senior High School patterns, and pupils in the Grade IX only pattern achieved higher than did the pupils in the High School organization. There was no significant difference between the achievement of pupils in the Grade IX only organization and pupils in the Junior-Senior High School pattern.

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TABLE XVII

COMPARISON OF ADJUSTED MEANS OF PUPIL SOCIAL STUDIES ACHIEVEMENT BY USE OF "t" TEST

Groups	"t"	Higher Group Mean	Significance
Grade IX only and Junior-Senior High School	2.41	Grade IX only	N.S.D.
Grade IX only and Junior High School	1.78	Junior High School	N.S.D.
Grade IX only and High School	4.16	Grade IX only	.001 level
Junior-Senior High School and Junior High School	5.51	Junior High School	.001 level
Junior-Senior High School and High School	1.11	Junior-Senior High School	N.S.D.
Junior High School and High School	5.25	Junior High School	.001 level

Mathematics achievement. The unadjusted and adjusted pupil achievement means in mathematics for the four major groups are given in Table XVIII. The difference of 2.87 points between the highest (Junior High School) and the lowest (High School) unadjusted means is reduced to only .43 points between the highest (Grade IX only) and the lowest (High School) after the means are adjusted to remove the effects of intelligence.

TABLE XVIII

UNADJUSTED AND ADJUSTED MEANS OF PUPIL MATHEMATICS ACHIEVEMENT FOR FOUR MAJOR GROUPS

Group	Number	Unadjusted Means	Adjusted Means
Grade IX only	366	55.96	57.10
Junior-Senior High School	299	55.85	56.86
Junior High School	1,345	57.82	56.77
High School	405	54.95	56.67

The adjusted analysis of variance for pupil achievement in mathematics is presented in Table XIX. The adjusted F ratio of .1057 is much less than the F ratio of 3.78 which is significant at the .01 level. No significant differences exists in the mathematics achievement of the four groups.

TABLE XIX

SUMMARY OF ADJUSTED ANALYSIS OF VARIANCE OF PUPIL MATHEMATICS ACHIEVEMENT FOR FOUR MAJOR GROUPS

Source of Variation	Degrees of Freedom	Mean Square	Adjusted F Ratio
Group	3	13.86	
Within	2410	131.11	.1057
	$F_{(\text{Crit.})}$ .01 = 3.78		

Science achievement. Table XX presents the means of pupil achievement in science for the four major groups. The Grade IX pupils in the Junior High School organization achieved an unadjusted mean of 58.48 which was 4.33 points higher than the unadjusted mean achieved by the lowest group (High School). After the adjustment of the means the Grade IX only group achieved a mean of 57.64 which was 1.81 points higher than that achieved by the lower group (High School).

TABLE XX

UNADJUSTED AND ADJUSTED MEANS OF PUPIL SCIENCE ACHIEVEMENT FOR FOUR MAJOR GROUPS

Group	Number	Unadjusted Means	Adjusted Means
Grade IX only	366	56.53	57.64
Junior-Senior High School	299	55.85	56.83
Junior High School	1,345	58.48	57.45
High School	405	54.15	55.83

The summary of the adjusted analysis of variance for pupil achievement in science for the four major groups is given in Table XXI. The comparison of the adjusted F ratio with that associated with 3 and 2410 degrees of freedom indicates that the difference in science achievement is significant at the .05 level.

TABLE XXI

SUMMARY OF ADJUSTED ANALYSIS OF VARIANCE OF PUPIL SCIENCE ACHIEVEMENT FOR FOUR MAJOR GROUPS

Source of Variation	Degrees of Freedom	Mean Square	Adjusted F Ratio
Group	3	315.06	
Within	2410	106.00	2.97
	$F_{(Crit.)}.05 = 2.60$		

The comparison of the adjusted mean of pupil achievement in science, two at a time by a "t" test, is shown in Table XXII. A significant difference was found between the achievement of the Grade IX only group and the High School group. The pupils in the Junior High School organization also gained a higher mean, significant at the .01 level, than did the pupils in the High School Group. There were no other significant differences between the science achievement of various groups.

Reading achievement. The reading score is based upon a maximum transmuted score of 50. Table XXIII shows the mean scores in pupil reading achievement for the four major groups. The unadjusted means vary only 1.99 points and the adjusted means vary only .64 points.

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TABLE XXII

COMPARISON OF ADJUSTED MEANS OF PUPIL SCIENCE ACHIEVEMENT, BY USE OF "t" TEST

Groups	"t"	Higher Group Mean	Significance
Grade IX only and Junior-Senior High School	1.01	Grade IX only	N.S.D.
Grade IX only and Junior High School	.316	Grade IX only	N.S.D.
Grade IX only and High School	2.44	Grade IX only	.02 level
Junior-Senior High School and Junior High School	.942	Junior High School	N.S.D.
Junior-Senior High School and High School	1.29	Junior-Senior High School	N.S.D.
Junior High School and High School	2.76	Junior High School	.01 level

TABLE XXIII

UNADJUSTED AND ADJUSTED MEANS OF PUPIL READING ACHIEVEMENT FOR FOUR MAJOR GROUPS

Group	Number	Unadjusted Means	Adjusted Means
Grade IX only	366	27.55	28.14
Junior-Senior High School	299	27.85	28.37
Junior High School	1,345	28.84	28.29
High School	405	26.85	27.73

Table XXIV presents a summary of the adjusted analysis of variance of pupil reading achievement for the four major groups. The adjusted F ratio of 1.504 indicates that there are no significant differences in reading achievement among the four groups.

TABLE XXIV

SUMMARY OF ADJUSTED ANALYSIS OF VARIANCE OF PUPIL READING ACHIEVEMENT FOR FOUR MAJOR GROUPS

Source of Variation	Degrees of Freedom	Mean Square	Adjusted F Ratio
Group	3	35.99	
Within	2410	23.92	1.504
	$F_{(Crit.)}.01 = 3.78$		

II. RESULTS OF ANALYSIS: MINOR PROBLEMS

The analysis of data which deals with the eight subdivisions of organization structure was necessary to examine accurately the minor problems of this thesis. The analysis of the eight groups indicated that a very wide range of intelligence existed across the eight groups (see Table XXV).

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[illegible]	[illegible]	[illegible]	[illegible]
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TABLE XXV

MEAN INTELLIGENCE PERCENTILE FOR EIGHT SUB-GROUPS

Group	Mean Intelligence Percentile	Number in Group
Grade IX only - one teacher	42.36	148
Grade IX only - two or more teachers	50.39	218
Junior-Senior High School - large school	47.26	195
Junior-Senior High School - small school	47.83	104
Junior High School - Non-City school	46.30	398
Junior High School - City school	54.84	947
Senior High School - large school	47.04	226
Senior High School - small school	44.21	179

This wide variation in the mean intelligence percentile is reflected in the unadjusted means for total achievement in Table XXVI.

The summary of the adjusted analysis of variance for total achievement of the eight groups is presented in Table XXVII. The difference in the total achievement of the eight

TABLE XXVI

UNADJUSTED AND ADJUSTED MEANS OF PUPIL TOTAL ACHIEVEMENT FOR EIGHT SUB-GROUPS

Group	Unadjusted Mean	Adjusted Mean	Number in Group
Grade IX only - one teacher	269.61	285.01	148
Grade IX only - two or more teachers	286.20	285.06	218
Junior-Senior High School - large school	276.91	282.23	195
Junior-Senior High School - small school	281.76	285.91	104
Junior High School - Non-City school	279.96	287.24	398
Junior High School - City school	296.75	286.43	947
Senior High School - large school	274.52	280.29	226
Senior High School - small school	265.90	277.50	179

minor groups was not significant at the .01 level. The adjusted F ratio of 2.33 does, however, point to a difference significant at the .05 level. In view of this difference, further investigation was warranted.

The means of the eight sub-groups were examined in the following manner. The minor problem questioned the difference between the two sub-groups of each of the four major groups so

the "t" test was applied to these groups. The results of the "t" tests are shown in Table XXVIII.

TABLE XXVII

SUMMARY OF ADJUSTED ANALYSIS OF VARIANCE OF PUPIL TOTAL ACHIEVEMENT FOR EIGHT SUB-GROUPS

Source of Variation	Degrees of Freedom	Mean Square	Adjusted F Ratio
Group	7	2908.60	2.33
Within	2406	1248.11	

$F_{(Crit.)}$ .01 = 2.64

.05 = 2.01

TABLE XXVIII

COMPARISON OF ADJUSTED MEANS OF PUPIL TOTAL ACHIEVEMENT BY USE OF "t" TEST IN EIGHT SUB-GROUPS

Groups	"t"	Higher Group Mean	Significance
Grade IX only, one teacher and Grade IX only, two or more teachers.	.15	Grade IX only two or more teachers	N.S.D.
Junior-Senior High School, large schools and Junior-Senior High School, small schools.	.86	Junion-Senior High School large schools	N.S.D.
Junior High School, Non-City schools and Junior High School, City schools.	.45	Junior High School, Non-City	N.S.D.
Senior High School, small schools and Senior High School, large schools.	.80	Senior High School, large schools	N.S.D.

No significant difference was found in the achievement level of the two sub-groups in any of the four major groups. The difference in achievement did not appear to be between the large school and the small school from the same organizational pattern or from the city school or non-city school from the same organizational pattern. The difference in achievement which was indicated by the initial F test on the data appears to be between the different organizational patterns, i.e., Junior High School and High School rather than between the types of schools found within each organizational pattern.

The results of the analysis presented in this chapter indicate that there are some significant differences in the achievement of Grade IX pupils enrolled in the schools of different organizational patterns. A discussion and summary of the significant differences will be found in Chapter V.

CHAPTER V

SUMMARY AND CONCLUSIONS

This study was conducted for the purpose of investigating the achievement of Grade IX pupils in each of four organizational patterns. The achievement in literature, language, social studies, mathematics, science, reading and total achievement, as measured by the High School Entrance Examinations was analyzed for pupils instructed within the four organizational patterns defined as follows:

A. Grade IX only in which Grade IX pupils are taught by teachers who teach only at the Grade IX level.

B. Junior-Senior High School in which Grade IX pupils are taught by teachers who are also teaching in Grade VII, VIII and high school grades.

C. Junior High School in which Grade IX pupils are taught by teachers who are also teaching in Grade VII and VIII but not in high school grades.

D. Senior High School in which Grade IX pupils are taught by teachers who are also teaching in the high school grades but not in Grades VII or VIII.

The transmuted scores obtained by Grade IX pupils on the High School Entrance Examinations were subjected to an analysis of co-variance with the achievement being the

criterion variable and, intelligence as measured by the SCAT test, being the covariant.

The analysis indicated that a difference in achievement --after the effects of intelligence are removed--does exist among the four groups of pupils attending Grade IX in different school organizational patterns. In this chapter a summary of the differences in achievement found is presented, and a discussion of the conclusions drawn from this study examine possible reasons for differences in achievement.

I. SUMMARY OF FINDINGS

Major problems. On the basis of this study the following summary is presented:

1. Grade IX pupils in a Junior High School organizational pattern achieved higher than did Grade IX pupils in a High School organizational pattern in the following: total achievement, literature, language, science and social studies.
2. Grade IX pupils in a Junior High School organizational pattern achieved higher in language than did pupils in a Grade IX only organizational pattern.
3. Grade IX pupils in a Junior High School organizational pattern achieved higher in social studies than did Grade IX pupils in a Junior-Senior High School organizational pattern.

4. Grade IX pupils in a Grade IX only organizational pattern achieved higher than did Grade IX pupils in a High School organizational pattern in the following: total achievement, literature, science and social studies.
5. Grade IX pupils in a Grade IX only organizational pattern did not achieve higher in any subject than did Grade IX pupils in a Junior High School organizational pattern.
6. Grade IX pupils in a Grade IX only pattern achieved higher in social studies than did Grade IX pupils in a Junior-Senior High School organizational pattern.
7. Grade IX pupils in a Junior-Senior High School organizational pattern achieved higher in language than did pupils in a Grade IX only pattern.
8. Grade IX pupils in a Junior-Senior High School organizational pattern achieved higher in language than did pupils in a Junior High School pattern.
9. Grade IX pupils in a Junior-Senior High School organizational pattern achieved higher in language than did Grade IX pupils in a Senior High School organization.
10. Grade IX pupils in a Senior High School organizational pattern did not achieve higher in any subject than did Grade IX pupils in the three other patterns.
11. There were no significant differences in the achievement of Grade IX pupils in any of the four groups in mathematics

or reading.

Table XXIX presents a summary of the "t" tests for the four groups. This summary is included to show in a concise form the differences in achievement which have been discussed in the preceding portion of this chapter.

Minor problems. No significant differences were found in the total achievement between:

1. Grade IX only pupils in schools where there was one Grade IX teacher only and Grade IX only pupils in schools where there were two or more Grade IX teachers.
2. Grade IX pupils in a Junior-Senior High School pattern in large schools and Grade IX pupils in a small Junior-Senior High School form of organization.
3. Grade IX pupils in non-city schools with Junior High School patterns and Grade IX pupils in city schools with Junior High School patterns of organization.
4. Grade IX pupils in large schools with High School patterns and Grade IX pupils in small schools with a High School organizational pattern.

TABLE XXIX

SUMMARY OF SIGNIFICANCE OF DIFFERENCES IN ACHIEVEMENT FOR FOUR MAJOR GROUPS

Subject	Grade IX only and Junior-Senior High School	Grade IX only and Junior High School	Grade IX only and High School	Junior-Senior and Junior High School	Junior-Senior and High School	Junior High School and High School
Total Achievement	N.S.D.	N.S.D.	Grade IX only higher .01 level	N.S.D.	N.S.D.	Junior High School higher .001 level
Literature	N.S.D.	N.S.D.	Grade IX only higher .01 level	N.S.D.	N.S.D.	Junior High School higher .001 level
Language	Junior-Senior High School higher .05 level	Junior High School higher .05 level	N.S.D.	Junior-Senior High School higher .05 level	Junior-Senior High School higher .05 level	Junior High School higher .05 level
Social Studies	Grade IX only higher .02 level	N.S.D.	Grade IX only higher .001 level	Junior High School higher .001 level	N.S.D.	Junior High School higher .001 level
Mathematics	N.S.D.	N.S.D.	N.S.D.	N.S.D.	N.S.D.	N.S.D.
Science	N.S.D.	N.S.D.	Grade IX only higher .02 level	N.S.D.	N.S.D.	Junior High School higher .01 level
Reading	N.S.D.	N.S.D.	N.S.D.	N.S.D.	N.S.D.	N.S.D.

II. CONCLUSIONS AND DISCUSSION

This study attempted to determine whether there were any significant differences in the achievement of Grade IX pupils attending Grade IX classes in schools with four different organizational patterns. Although the findings were not conclusive, certain trends were evident which may prove worthy of consideration in the placement of the Grade IX class within the organizational structure. Some of the differences in achievement may be explained after consideration of the following statements which attempt to identify variations in practices in the different school organizational patterns.

1. In the Junior High School and Grade IX only patterns the achievement of the Grade IX pupils is often considered to be a criterion of success since the Grade IX class is the senior class in the organizational pattern and represents a culmination of the academic offering at that organizational level.
2. The promotion policies in the four patterns of organization may vary widely. It is possible that the Grade IX pupils who write final examinations in the Junior High School and Grade IX only patterns may represent pupils who are better prepared for Grade IX and that pupils who are not so well prepared do not attempt to write Grade IX examinations

because they have not been promoted to Grade IX. The Grade IX pupils in the High School organizational pattern may have been promoted to Grade IX when they were not completely prepared for the work of that grade.

3. The assignment of teachers to the Grade IX classes may vary from one organizational pattern to the other. The High School organization may assign teachers who are not well qualified to teach at the Grade XII level to the Grade IX class, while in an organization in which the Grade IX class represents the senior class the better qualified teacher may be assigned to the Grade IX class.

The conclusion drawn from the analysis of material applicable to the minor problems of this study is that no significant differences in achievement occur when each of the four organizational patterns are associated with different situations. The attendance of Grade IX pupils in Junior High School and Junior-Senior High School organizational patterns in large schools or small schools does not appear to influence the total achievement of the Grade IX pupils. The location of a school with a Junior High School form of organization in a non-city or city setting does not reflect a difference of achievement of Grade IX pupils when the effects of ability are removed. In a Grade IX only organization in which there was only one teacher the total achievement of pupils was not

significantly different from that of pupils attending a Grade IX only organization in which two or more teachers taught Grade IX.

Implication of this study. Since the placement of the Grade IX class within the organizational pattern of a school seems to have an effect upon the achievement of the Grade IX pupils, administrators of schools should be cognizant of this and attempt to organize schools in such a manner that the Grade IX pupils will be placed within an organization in which the achievement of the Grade IX pupil has been demonstrated to be higher. In this study the achievement of Grade IX pupils in a Junior High School form of organization was found to be significantly higher than the achievement of the Grade IX pupils in the three other patterns in seven instances. In only one instance (a comparison of language achievement of Grade IX pupils from Junior-Senior High School patterns and Junior High School patterns) was another group of Grade IX pupils found to achieve higher than Grade IX pupils in the Junior High School form of organization. It appears that the possibility of placing Grade IX pupils in a Junior High School pattern should be considered by all school administrators but that further study may be warranted.

The implications of this study for decisions which a

school principal makes with regard to staff allocation are evident. The organizational patterns described in this study, being based upon patterns of staff allocation, might be instituted in most schools. Since Alberta schools usually enrol a range of grades--Grades I-XII, I-XI, VII-XII, I-IX, IX-XII or VII to IX--a Junior High School Organizational pattern as described in this study is possible in many or most schools. The principal would usually be able to allocate teachers to Grade IX in such a manner that the findings of this study could be utilized.

Where a Junior High School form of organization is not feasible, consideration should be given to a Grade IX only organization where the Grade IX class is taught by a single teacher or by teachers who teach only at the Grade IX level. Further consideration should also be given to possible reasons why pupils from one organizational pattern achieve higher than do pupils from another organizational pattern. If credible reasonscan be discovered it may then be possible to adjust certain constituents of the organizational patterns so that significant differences in achievement do not exist; that is, so that the limitations of a particular organizational pattern may be reduced.

Suggestions for further research. This research may be looked upon as an exploratory study which indicated that differences in achievement of Grade IX pupils do exist in four different organizational patterns, and a number of possibilities for further investigations are suggested:

1. A study similar to this one involving four organizational patterns but on a smaller scale which would facilitate the investigation of promotion policies within the schools and of the qualifications of the teachers of the Grade IX class.
2. A study investigating the relative achievement of pupils in the Junior High School organizational pattern located in non-city and city centres with the examination of promotion policies and teacher qualifications being an integral part of the study.
3. A study involving a smaller number of pupils from each of the organizational patterns whereby such factors as intelligence, teacher qualification and the promotion history of pupils can be controlled.

Concluding statement. This study of the achievement of Grade IX pupils where the Grade IX class is taught in different organizational patterns has not been conclusive in finding that the pupil achievement is a total result of the

placement of the Grade IX class within the organizational framework of the school. It has, however, raised the question of Grade IX achievement in each of the organizational patterns by indicating that a difference in achievement does exist and that the difference seems to be in favor of pupils in an organizational pattern where the Grade IX class is looked upon as the senior class in the organizational pattern. This study has also suggested further examination of Grade IX achievement as influenced by the placement of the Grade IX class within the organizational framework as defined by the allocation of teaching duties.

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B29847